

SIXPENCE

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VOLTAGE MULTIFYING RECTIFIERS

From an Article by W.T. Cocking in "Wireless World"

Methods of obtaining a result with a minimum of material are always of interest, and this is especially so at a time like the present, when one often has to make do with parts that are to hand. A method of obtaining quite high voltages without having to employ a transformer is described, it forms a useful alternative to more orthodox circuits.

The voltage doubler circuit is very well known, but it is not always realised that the principle can be extended; voltage-tripler and voltage-quadrupler circuits being quite feasible. It is first necessary to be quite clear about the mode of operation of the doubler circuit. The arrangement is shown in Fig. 1. and it will be seen that two valves are used with two reservoir condensers. The AC input can be either from a transformer or directly from the mains.

On the positive half cycles of the input the point A is positive with respect to B and the anode of V1 is positive with respect to its cathode for this valve is connected in series with C1 across AB. The valve consequently conducts and charges C1, the upper plate of this condenser becoming positive with respect to the lower. The cathode of V2 however is connected to A so that its anode is more negative than its cathode and in consequence it does not operate. On the negative half cycles, the operation is reversed, and the condenser C2 now becomes charged through V2 and its upper plate becomes positive with respect to the lower. The output voltage is taken

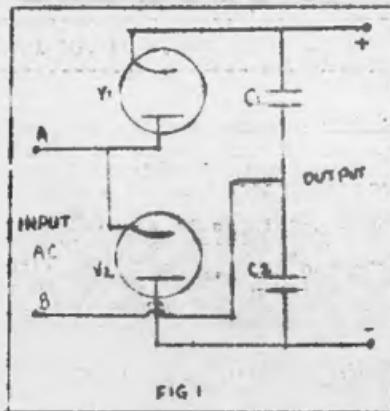


FIG 1

across the two condensers in series and is thus twice, that on either condenser alone. When no current is taken from the output each condenser charges to a potential of 1.4.4 times the RMS value of the input alternating voltage. On load the voltage naturally drops.

The voltage doubler of Fig 1 is based upon the series type, half wave rectifier of Fig 2 (a) and consists merely of two of these used together. It is however, equally possible to employ the parallel type of rectifier shown in Fig 2 (b). The operation is substantially the same. The valve conducts on the negative half cycles and the condenser charges, its right hand plate becoming positive with respect to its left hand. When two of these rectifiers are put together in the obvious

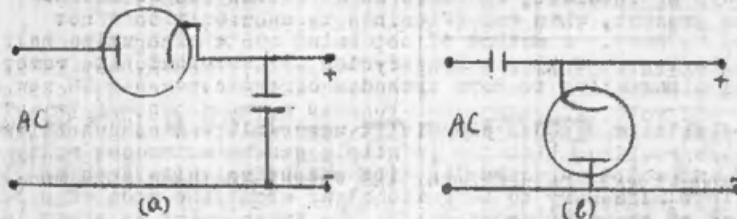
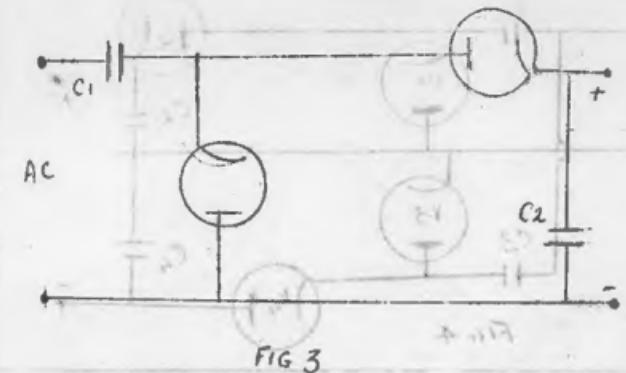


FIG. 2.

way the voltage doubler of Fig 1 results. This normal voltage doubler therefore can be broken down into two series type half wave rectifiers, or into two parallel type.

It is, however, possible to build a voltage doubler from one half wave rectifier of such type instead of from two of either. This is shown in Fig 3. Before discussing this circuit it is necessary to be quite clear about the simpler half-wave rectifiers of Fig 2. The series circuit (a) works on the positive half cycles of the input and on no load the condenser becomes charged to the peak value of the input voltage. On load the voltage across the condenser fluctuates. The mean discharge current constitutes the current drawn from the circuit and used in the load, while the fluctuations are the ripple or hum on the output.

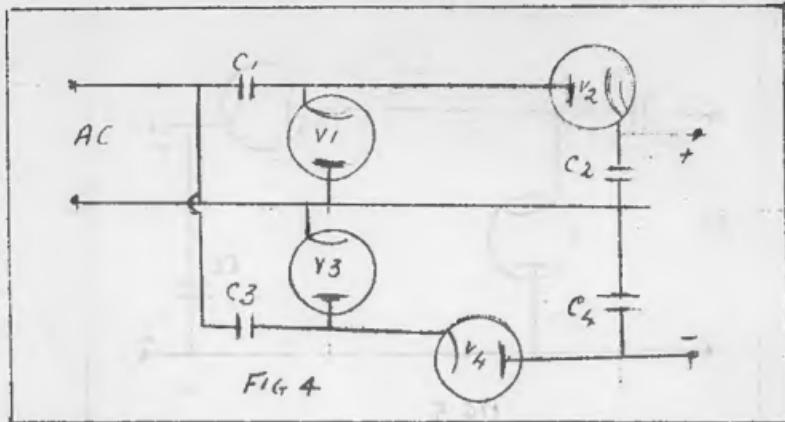
In the case of the shunt circuit (b) exactly the same thing happens, so far as the condenser is concerned, but the output is now the condenser voltage in series with the AC supply. When no current is drawn the output voltage is fluctuating between zero and twice the peak value of the input. This is why the circuit as it stands is never used. Even on no load the rippy voltage on the output is equal to the mean steady voltage.



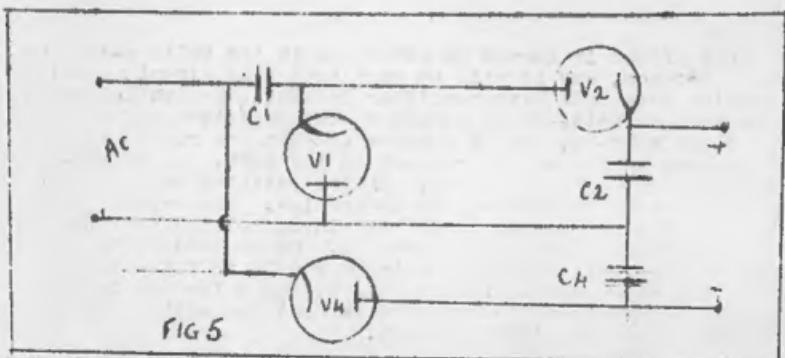
This effect is turned to advantage in the voltage-doubler of Fig 3 however, and it will be seen that this circuit consists of a series type half wave rectifier following a parallel type. What happens is this--V1 conducts on the negative half cycles of the input voltage, and C1 charges so that its right hand plate becomes positive with respect to its left. V2 is non-conducting during these periods. On the positive half cycles V1 becomes non-conductive and V2 conductive. The voltage acting on V2, however, is not merely the input voltage but the sum of this voltage and that across C1. On no load C1 is charged to the peak value of the input and C2 to twice this value. This condenser therefore must be rated for working at twice the voltage that will suffice for C1 the rating for the latter being the peak input voltage.

It should be pointed out here that in the foregoing description the term half-cycle has been used as if the valves conducted for precisely this time. In actual fact this period is usually less than one half cycle and depends on the load and condenser capacity.

The voltage-quadrupler should now be clear. It is nothing more than two voltage-doublers of the type of Fig 3 and the arrangement is shown in Fig 4. C2 and C4 should be twice the voltage rating of C1 and C3 but the capacities can be the same.



The voltage-tripler is a combination of the voltage-doubler of Fig. 3 and the half-wave rectifier of Fig 2 (a). It is the quadrupler less V_3 and C_3 and is shown in Fig 5.



The regulation of these circuits is by no means good unless very large capacities are used. This is not only expensive but bad for the rectifiers on account of the high peak currents which will then flow. In general they are most valuable when high voltages at low currents are desired.

In conclusion it should be pointed out that although the diagrams all show valves for the rectifiers there is no reason why metal rectifiers should not be used.

BOOK REVIEW.

We are proud to announce publication of the 1942 edition of the RADIO AMATEUR'S HANDBOOK -- for sixteen years the internationally-recognised standard manual of high-frequency communication.

The 1942 edition continues the long record of comprehensive and authoritative coverage of its field established by its eighteen predecessors. The field of short-wave radio knowledge has been compressed between its two covers. Its pages contain all the latest and best in ideas and equipment.

In the preparation of this new handbook dozens of items of equipment were constructed and tested. As always, this equipment represents the best in current amateur practice rather than striking or novel innovations of unproved merit, and is based on time-tried circuits and layouts of established worth.

In planning the handbook for 1942, the editors were governed by defense needs. The general plan of the book has been revised to meet the growing need for simple and non-mathematical, but thorough, text on the theory, design and operation of radio communication equipment, as well as to provide the constructional information on tested and proved amateur gear which has always been an outstanding feature of the book.

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SLOUCH HATS and FORAGE CAPS

When this column was first started one representative from each State was to forward me notes each month. After roughly six months no Interstate Notes have yet reached me, nor have any State representatives been chosen as far as I am aware. In States where the WIA is dormant, this is not very encouraging, but it shows all the signs of "India's Famous Non-co-operation Policy," in States where the Institute still meets each month. How about it VK 3, 4, 5, 6 & 7 ???? There are most of the chaps back home from abroad, so how about some news of them, and their doings.

Over here is VK2...2X1, 2PX, 2FT & 2ZK are definitely known to be "Back home" although the general news seems to be that "all the chaps got back."

One whom this does not apply, worse luck, is our Ex Pres. President and State Councillor, Bill Moore 2HZ, whom duty seems to have necessitated that he stay in Java while others were able to escape. To do ones duty under such conditions, when loved ones are most prominent in ones mind, and ones friends seem to have "all the luck," takes pretty high courage....so you will all join me, I know, in saying....Good Luck, Bill... hpo cungr, cm.

Harold Ackling 2PX returned from the Middle East and the Three Campaigns over that way, along with 2APT and others. They are now "quite" sure there is no place like "old VK." Hi! 2PX has now reached the stage of being "two grandfathers"...somebody said that the first grandchild is already in the post-war R.A.F.W., but "I" can't say for sure...seems pretty good even for a descendant of 2PX. Hi!

2ZK...Captain Henry now if you don't mind...is also back. Both the above boys speak very highly of Arthur's work as a technician, and feel he deserves the promotion. Speaking personally, 2VC wonders where all the other Commissions are that were to come to those who enlisted in Arthur's Special Duty Unit?????

2AM, writes from among the Yanks and (he hasn't met a Ham yet) Australia's North. He has met 2AM3 and 2AMP and 2ALG so he should have a good time in his spare moments. They will tell you about Xmas in the North after the War. He didn't say just which one of them could get into a hole quickest when the Japs ISO, but dignity plays no part in the race.. Hi!

Digressing a little from V.K.s...The Jan., English Ham Mag (the T & K Bulletin) reports the death over there in an aeroplane accident of ZL4AI whilst carrying out highly important work for the R.A.F. Anybody who knew the Radio Calibre of 4AI will have little doubt this was real HUSH HUSH stuff. The loss of 4AI will be felt by New Zealand Ham Radio when the war is over, particularly when the time comes again to call "Test Beru."

Cec Horne, 2AIK, is thinking of trying to change from the A.M.F. to R.A.F. This is Cec's second War, and judging by the Education Department's efforts to get him out, they think one for lifetime is enough. Hope you beat them to it Cec, om.

VK2AKT may have also failed to get out of Java. Bert left Australia in the second week of war as a Corporal...Wireless O. Mechanic. After 13 months he was invalided back with Malaria having risen in that time to Flight Sergeant. Progressing to F/O he was stationed at Richmond before being lent on Special Duty to R.A.F. He served in Malaya and was last mentioned as being in Batavia...but we hope he will be among those who "get away."

VK2AJK has been transferred from VK3 to far up into VK4...gods to me it's this chapp, must be sky a few J.Q.S.L.s....where he is doing Instructional work. He seems to think they could find more exciting work for a Sergeant to do.

2HC also a Sergeant these days is still instructing at Bradfield. I am sure all VK Hams join in wishing our F.d. QSL Officer 3RJ hearty congratulations on at least getting a Commission. Its a Service chock full of talent when we're up with Kay's experience of traffic handling takes us long as this to get a Commission...anyway good luck Ray, om. hope you'll be a Flight Loot, vy soon. Hi!

3MK is reported to be back in VK3 after his escape from Singapore. We're waiting for your story OM. 3UW and 3XS are missing believed to be prisoners of war. 3CG has arrived back from the

Middle East. 3IC is somewhere in the Pacific. 3LR is now a Flight Sgt. 3AB is with a RAAF Mobile squadron. 5ZX is a pilot officer while 20R has the rank of Flying Officer. 5JT is a RAAF Sgt.

Well, that's all the news I have...BUT...what about those St to Representatives or some news...C/o 78 Maloney St. Mascot N.S.W. or Telephone MUL092.

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ON ACTIVE SERVICE

Herewith a list of New South Wales Amateurs on active Service compiled from Cards returned to Federal Headquarters. If you are on Service and your name does not appear on this list, kindly furnish full particulars to Divisional Secretary, 21 Tunstall Avenue Kingsford, N.S.W. as soon as possible.

ARMY.

Capt. A. Henry	A.I.F. VK2ZK	Licut. S. Jacobs A.M.F.	VK2SJ
Sgnlmn H. Ackling	" VK2PX	Capt. S. Thetham "	VK2ST
Sgnlmn H. Hilder	" VK2PT	Licut. G. Partridge "	VK2VU
Sgnlmn A. Purce	" VK2AHB	Corporal A. Stowar "	VK2ACX
Sgnlmn F.C. Duxman	" VK2ADH	Capt. J. Walls "	VK2AME
Sgtmnt. J.D. Ollie	" VK2OZ	Sgnlmn. J. Franklin "	VK2ALP
Sgnlmn D.C. Campbell	" VK2CU	Licut. J. Ackerman "	VK2ALG
Corp. G.T. Lawson	" VK2AFN	Sgnlmn. A.J. Sclyno "	VK2AJ0
Corp. T.J. Davies	" VK2ADS	Corp. F. Bull "	VK2AJM
W/O* Lloyd Davis	" VK2AI	Sergeant C. Horn "	VK2AIK
Sgnlmn. H.B. Cottonill	" VK2ZY	Sergeant A.J. Pratt "	VK2AHE
Licut. J.H. Cooper	" VK2ZG	Sergeant F.U. Curlewis "	VK2AHC
Sergt. E. Simpson	" VK2ES	Corporal G. Pryor "	VK2AMP
Corp. G... Rutter	A.M.F. VK2CB	Sapper R. Haining "	VK2AMQ
Gunner D. Dunn	" VK2EG	Captain I. Gardiner "	VK2ABY
Captain N.J. Hurll	" VK2HJ	Chaplain M. Winkler A.I.F	VK2MP
Captain D.B. Knock	" VK2MO	Gunner H. Hocking A.M.F.	VK2AMG
Sgnlmn. G.G. Bower	" VK201	Sgnlmn H. Bushell A.I.F.	VK2AHG
Licut. F... Carruthers	" VK2PF	Sgnlmn C. Roberts "	VK2JV
W.O. R. Felton	" VK2RF		

Navy.

P.O. Tel. D. Duff	VK2E0	L.T.O. R.G. Morgan	VK2ABM
Licut. Commdr. L. Swain	VK2CS	Licut (U). Ian Cuffe	VK2XC
P.O. Tel. W. L. Hurriss	VK2ALF	L.T.O. L.S. Moyers	VK2KS
T.O. Tel. H.S. Young	VK2AMZ	P.O. Tel. L.C. Bracken	VK2FF
T.O. Tel. L.J. Guse	VK2AMJ	Chief R.O. W. Johnston	VK2YZ
Tel. H.C. Perris	VK2AIH	Chief R.O. K.B. Brown	VK2AKB
P.O. G.S. McLeod	VK2ADC	Eqo. J. Field	VK2AKF
Tel. J.M.D. Roberts	VK2ACK	R.O. H. Fullar	VK2VK
Tel. A. Morris-Kees	VK2ACG	R.O. J. Ellis	VK2AIL

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AIR FORCE.

Pilot Officer M.M. Moore	VK2HZ	A.C. 11. C. McDonald	VK2AKK
Flt. Lieut. J.L. Gray	VK2AKO	Sergeant K.J. Graham	VK2AG
L.A.C. J.H. Pearce	VK2AMV	Sergeant A. McMurring	VK2..JK
Pilot Officer K.G. Avery	VK2AMS	A.C. 1 V. Egan	VK2AJI
L.A.C. D. Dengin	VK2ANF	Sergeant S. Weston	VK2LJH
Flt. Lieut. T.G. Thorp	VK2ANC	A.C. 1 S G. C. Curle	VK2AJB
Sergeant Lionel Cuffe	VK2AMA	Sergeant E. Cleburne	VK2..LL
Corporal V. Jarvis	VK2VJ	Sergeant G. Bailey	VK2AGI
Pilot Officer F.M. Gaynor	VK2UX	Sergeant A. Hughes	VK2AGR
Sergeant K. Shrock	VK2TJ	Corporal N.J. Bagling	VK2..Y
W/O F. Hines	VK2QL	Pilot Off. A. Haytt	VK2AFT
L.A.C. A. Fiott	VK2QE	Sergeant J. Howes	VK2..BS
Flying Officer M. Brown	VK2OR	Corporal F. Stirk	VK2ABC
LAC. W. Francis	VK2OF	Sergeant N. McNaughton	VK2ZH
L.A.C. L. Dodds	VK2LD	Sergeant J. Woodman	VK2ZE
Sergeant H. Carter	VK2HC	A.C. 1 J. Vultrs	VK2..LW
Pilot Officer B. Glassop	VK2BG	A.C. 1 Wallbridge	VK2UI
Ft. Sergeant J. Evans	VK2CX	Pilot Off. K. Abbott	VK2YK
Ft. Sergeant J.H. Moyle	VK2EZ	Pilot Off. J. Moyle	VK2JU
R.I. N. Bourd	VK2ALJ	Sergeant R. Black	VK2YL
Sergeant C.J. Henry	VK2UR	Corporal B. Dale	VK2XX
Pilot Officer R. Chilton	VK2NC	Corporal K. Williams	VK2XN
L.A.C. A.E. Peppercorn	VK2..J	A.C. 11 W. Piggott	VK2WM
Sergeant N.J. McLeod	VK2PM	L.A.C. Olofberg	VK2VV
Flying Off. R. Douglas	VK2ON	Pt. Sergeant R. Gorthorn	VK2VG
W/O D. Milne	VK2LQ	Pilot off. M. Morris	VK2VN
Flying Off. J. Duffy	VK2HR	A.C. 1 A. Blair	VK2DX
Corporal B.C. Brown	VK2..J	Pt. Srg. A. Fanto	VK2GV
Flying Off. G. Kompton	VK2CI	Sergeant F. Bischoff	VK2LZ

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DIVISIONAL NOTES

At the April Meeting of the Executive inactive States were again discussed and it was decided to continue with efforts to put VK5 on its feet again. The work of 7PA in Tasmania was favorably commented upon and it was felt that this Division would again be active very soon.

The Chairman informed the meeting of the progress made by the New South Wales Division in its efforts to establish an Emergency Communication Network in conjunction with the State War Effort Co-ordination Committee and it was decided to write the States and endeavor to obtain information as to the manpower and equipment that would be available should VK2 prove successful in their efforts.

To date 721 Census Cards have been returned and the various States' totals are as follows:-

VK2.246, VK3.201, VK4.101, VK5.95, VK6.52 and VK7.26

This return must be considered as satisfactory but unfortunately some Members of the Institute have failed to return cards. Remember this, the Service Register will be the strongest evidence possible to place before the authorities when the time comes to ask for frequencies.

-- NEW SOUTH WALES DIVISION. --

The April General Meeting was held at Y.M.C.A. Buildings, Pitt Street Sydney on the 16th.

Discussion centred around a letter from Federal Headquarters suggesting the amalgamation of the Monthly Bulletin with "Amateur Radio". Members generally were of the opinion that the Bulletin was playing a great part in maintaining contact between members and was the reason why the strength of the Division was being maintained after nearly three years of war. Nevertheless it was felt that if the amalgamation would be for the benefit of amateur radio in Australia, it should take place.

The Chairman informed the meeting of the progress made in the negotiations with the State War Effort Co-ordination Committee, and the formation of an Emergency Communication Network.

Amateurs throughout Australia will regret to learn that Pilot Officer Bill Moore VK2HZ is a prisoner of war in Java.

The next General Meeting of the Division will be held at Y.M.C.A. Buildings Pitt Street, Sydney on Thursday 21st May, and all Amateurs are invited to attend.

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VICTORIAN DIVISION

The Fighting Forces were well represented at the last meeting of the Victorian Division. Amongst the visitors was WSVHV of Detroit, Michigan, who reported that there were 5000 Hams in the district. Other visitors were VK5KL and VK2XX/9AX.

The morse classes held by the division are now being conducted on five nights during the week. Monday to Friday inclusive, and the class Manager Mr. H. N. Stevens VK3JJO would be very pleased if anyone wishing to let us an instructor would get in touch with him at the Institute F6997.

It is reported that 3YK has arrived back in VK3 after his escape from Singapore and it is hoped that he will be able to attend the next meeting and give an account of his experiences.

3RX.. is still pushing ships in and out of port (An obstinate artist's sketch of this would prove interesting.)

3BQ.. reported that he had a quiet day--he only ground eleven Xtrs. Max is continually installing new equipment which keeps him busy. Is looking for some quartz.

3RJ.. Congratulations Ray on the commission.

3BM.. I hear is now married. Congratulations Bruce.

3JO.. reports that his brother 3OJ has been called up and is with Army Signals, 3JO, thinks that after reading last month's notes is of the opinion that the notes editor 3HK has a one track mind. (Gosh Herb I must read the notes to see what you mean.)

3YL.. bemoans the fact that the OM has been called up. 3YL is doing a FB job at the morse classes.

3WQ.. has a system of 6 or more relays to switch automatically from one RX in the shack to the other in kitchen using one push button and one wire line to control everything except tuning. A special feature is that Chas can monitor the junior op in the shack by means of a different pressure on the same button!!!

3LQ.. is very busy with ARP work - is Deputy Warden of an area.

Ken Ridgway rang up after a hectic trip home to enquire as to the whereabouts of his pants?????. It's quite alright though Ken took the wrong bag by mistake and left the one containing his working clothes.

3HX.. received these notes from 3JO, who ends up with "Well that ought to keep you quiet for this month you old-- (and then a lot of st-rs and such things.) I wonder just what he means????

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Meeting Night—First Tuesday in each month.

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

HAMS !

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